Alg. 2 Warm Up # 2-2

Number the problems and show your work:

1. Solve the system: $\begin{cases} 4x - 3y = 11 \\ y = 2x - 5 \end{cases}$

2. Solve using the zero product property:

a) $x^2 + 5x - 14 = 0$ b) $x^2 - 6x = 0$

MATH NOTES — METHODS AND MEANINGS

p. 6

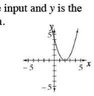
In your math spiral:

Functions

A relationship between inputs and outputs is **a function** if there is no more than one output for each input. Functions are often written as y = some expression involving x, where x is the input and y is the output. The following is an example of a function.

$y = (x-2)^2$

x	−2	−1	0	1	2	3	4	5
y	16	9	4	1	0	1	4	9

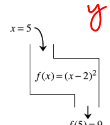


In the example above the value of y depends on x, so y is also called the **dependent variable** and x is called the **independent variable**.

y

x

Another way to write a function is with the notation "$f(x)=$" instead of "$y=$". The function named "f" has output $f(x)$. The input is x.



(5,9)

In the example at right, $f(5) = 9$. The input is 5 and the output is 9. You read this as, "f of 5 equals 9."

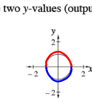
x y

The set of all inputs for which there is an output is called the **domain**. The set of all possible outputs is called the **range**. In the example above, notice that you can input any x-value into the equation and get an output. The domain of this function is "all real numbers" because any number can be an input. The outputs are all greater than or equal to zero, so the range is $y \geq 0$.

$x^2 + y^2 = 1$ is not a function because there are two y-values (outputs) for some x-values, as shown below.

$x^2 + y^2 = 1$

x	−1	0	0	1
y	0	−1	1	0



$x^2 + y^2 = 1$

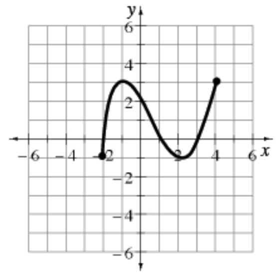
$\sqrt{y^2} = \pm\sqrt{1 - x^2}$

$y = \sqrt{1 - x^2}$

$y = -\sqrt{1 - x^2}$

HW Questions:

1-34. Examine $g(x)$ graphed at right.



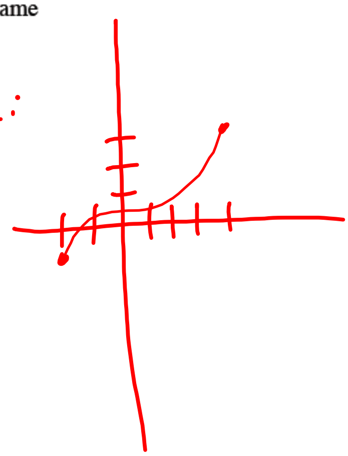
a. Which x-values have points on the graph? That is, describe the domain of $g(x)$.

b. What are the possible outputs for $g(x)$? That is, what is the range?

c. Ricky thinks the range of $g(x)$ is: $-1, 0, 1, 2,$ and 3. Is he correct? Why or why not?

d. Draw a graph for another function with the same domain and range as $g(x)$.

Example:



1-35. Consider the functions $f(x) = 3x^2 - 5$ and $g(x) = \sqrt{x-5} + 2$.

a. Find $f(5)$.

b. Find $g(5)$.

c. Find $f(4)$.

d. Find $g(4)$.

e. Find $f(x) + g(x)$.

f. Find $g(x) - f(x)$.

g. Describe the domain of $f(x)$.

h. Describe the domain of $g(x)$.

i. Why is the domain of one of these functions more restrictive than the other?

e) $3x^2 - 5 + \sqrt{x-5} + 2$

$3x^2 + \sqrt{x-5} - 3$

1-36. Nissos and Chelita were arguing over a math problem. Nissos was trying to explain to Chelita that she had made a mistake in finding the x-intercepts of the function $y = x^2 - 10x + 21$. *"No way!"* Chelita exclaimed. *"I know how to find x-intercepts! You make the y equal to zero and solve for x. I know I did this right!"* Here is Chelita's work:

Step 1: $x^2 - 10x + 21 = 0$, so $(x+7)(x+3) = 0$.

Step 2: Therefore, $x + 7 = 0$ or $x + 3 = 0$.

Step 3: So $x = -7$ or $x = -3$.

Nissos tried to explain to Chelita that she had done something wrong. What is Chelita's error? Justify and explain your answer completely.

1-37. As you have found when using a graphing calculator, equations must be solved for y; that is, they must be written in y-form. Rewrite each equation below so that it can be entered into a graphing calculator.

a. $x = 3y + 6$

b. $x = 5y - 10$

c. $x = y^2$

d. $x = 2y^2 - 4$

e. $\sqrt{x} = \sqrt{(y-5)^2} \rightarrow \pm\sqrt{x} = y - 5$

$\quad +5 \quad\quad +5$

2 equations

$y = 5 + \sqrt{x}$

$y = 5 - \sqrt{x}$

1-38. Given $f(x) = 2x - 7$, complete parts (a) through (c) below.

a. Compute $f(0)$. $\rightarrow f(0) = 2(0) - 7$

$f(0) = -7$

b. Solve $f(x) = 0$.

c. What do the answers to parts (a) and (b) tell you about the graph of $f(x)$?

gives you the y-intercept: $(0, -7)$

1-39. Gregory planted a lemon tree in his back yard. When he planted the tree, it was 2 feet tall. He noticed that it has been growing 3 inches every week.

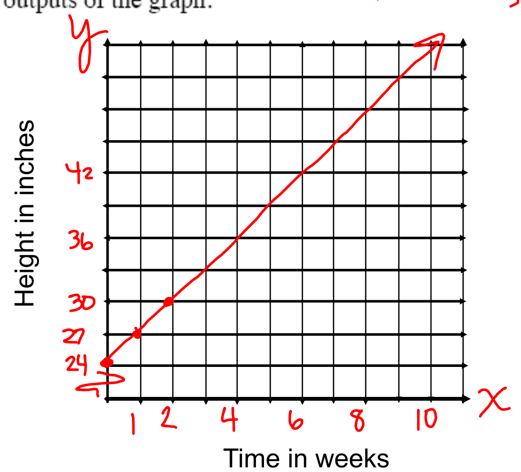
a. Create multiple representations ($x \rightarrow y$ table, graph, and equation) to represent the relationship between the days that have passed and the height of the tree. $y = 3x + 24$

b. If the tree continues growing at this rate, when will it be 6 feet tall? How can you see this in each of the representations?

72 inches

c. State the possible inputs and outputs of the graph.

x	y inches
0	24
1	27
2	30
3	33



1-40. Solve each of the following equations. Be sure to check your solutions.

a. $4(x-1)-2(3x+5)=-3x-1$

b. $3x-5=2.5x+3-(x-4)$

$x = 13$

$3x-5 = 2.5x+3-x+4$

$3x-5 = 1.5x+7$

$-1.5x \qquad -1.5x$

$1.5x-5 = 7$

$+5 \qquad +5$

$\frac{1.5x}{1.5} = \frac{12}{1.5}$

$\boxed{x = 8}$

Keep your homework today. Don't turn it in. ☻

Yesterday's CP's:

1-28. Use your graphing calculator to draw a complete graph of $y=(x-12)^2+11$.

a. What happens when you use the standard window?

b. What window settings did you use to see enough of the graph to help you visualize and draw a complete graph?

c. What are the domain and range of the function?

$y \geq 11$

vertex

$(12, 11)$

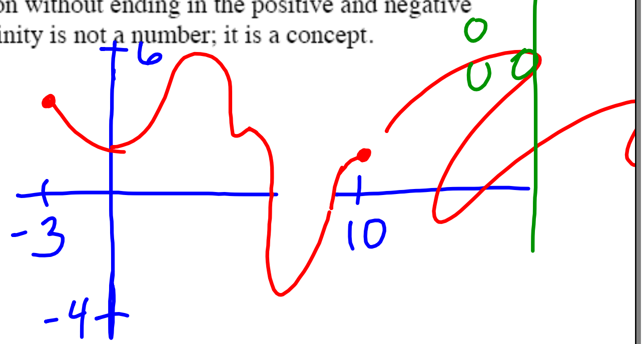
1-29. Now you will reverse your thinking to create a graph with a given domain and range.

a. Sketch a function that has a domain of all real numbers between and including -3 and 10 (written $-3 \leq x \leq 10$) and a range of all real numbers between and including -4 and 6 (written $-4 \leq y \leq 6$). You do not have to write an equation for your function. Verify your endpoints with your team. Be creative.

b. Sketch a function with a domain of all real numbers and a range of the values 2, 4, 5, and 8 (written $y = 2, 4, 5, 8$).

$\mathbb{R}$

The domain of all real numbers can be written $-\infty < x < \infty$. The symbols $-\infty$ and ∞ represents positive and negative **infinity**. They mean that the domain goes on without ending in the positive and negative direction. Infinity is not a number; it is a concept.



1-30. How can a graphing calculator help you find the solution to a system of equations? Consider this system:

$$5x - y = 35 \rightarrow y = 5x - 35$$
$$3x + y = -3 \qquad y = -3x - 3$$

a. First graph the system in a standard window. Can you see the solution on your screen?

b. To find the solution you will need to change the window on your calculator. Discuss with your team what maximum value, minimum value, and scale you should use for the x- and y-axes in order to see the intersection. After you have decided, check your conclusion on the graphing calculator.

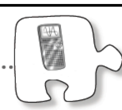
$\boxed{2^{nd}}$ (Calculate)

c. Use a "trace" function on your calculator to find the solution from the graphs. Then solve the system algebraically.

d. Discuss the two methods with your team. Explain which one your team prefers and why.

Together as a class.

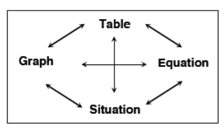
1.1.4 How can I represent intersections?



Points of Intersection in Multiple Representations

CP's: 1- #41 ---> 44

Throughout this course, you will represent functions in several different ways, and you will find connections between the various representations. These connections will give you new ways to investigate functions and to justify your conclusions.



How can these connections help you understand more about systems of equations? In this lesson, you will make connections between ways of representing a system of equations as you use your graphing calculator to find the points of intersection in multiple representations.

1-41. INTERSECTION INVESTIGATION

In Lesson 1.1.3, you used the features of your graphing calculator to find a point of intersection of two graphs. Can you use other representations as well? What about other strategies? Are all strategies equally accurate? Which do you prefer?

Your Task: Work with your team to find *as many ways as you can* (with *and* without your graphing calculator) to determine the points of intersection of the functions $f(x) = 2x^2 - 5x + 6$ and $g(x) = -2x^2 - x + 30$. Be sure to think about tables, graphs, and equations as you work.

Discussion Points

How can we find it using graphs? Graph both equations, use calculate intersection feature.

How can we find it using equations? Solve the system algebraically.

September 13, 2016

1-42. Jason and his team were working on finding the points of intersection of $f(x) = 2x^2 - 5x + 6$ and $g(x) = -2x^2 - x + 30$. He suggested, *"Maybe we could start by looking at the graphs of the functions."*

a. Use your graphing calculator to help you graph $f(x)$ and $g(x)$.

b. Adjust the viewing window so that you can see all of the points of intersection. How accurately can you approximate the coordinates of these points by looking at the graph? Give it a try.

c. ~~Use the "trace" feature to get a more accurate approximation of each of the points.~~

d. With your team, explore the [CALC] feature of your TI83/84+ graphing calculator. Can you find a way to make the graphing calculator calculate your points of intersection for you? How accurate are your results?

(-2, 24) (3, 9)

1-43. Aria was in Jason's team. She had another idea and asked, *"Can't we find the points of intersection by comparing the tables of our two functions?"*

a. What did Aria mean? How can you find points of intersection by looking at tables?

b. Use your graphing calculator to make tables for $f(x)$ and $g(x)$. To do this, you will need to explore the [TABLE] and [TBLSET] features of your TI83/84+ calculator.

c. Find all of the points of intersection in the tables. How accurate are these results?

d. Can you think of any circumstances in which using a table might not be an efficient or accurate strategy for finding points of intersection? Explain.

1-44. Delilah listened to Jason and Aria explain their ideas. She said, *"I thought of another way! We have a method for using the equations to find points of intersection even without the graphing calculator, don't we?"*

a. What method is Delilah referring to?

b. Use Delilah's method to find the points of intersection of these two functions.

Further Guidance section ends here.

HW: 1- # 46 ---> 52

Short Individual Quiz on Thursday.

Zero Product Property
Evaluate: like "find f(3)..."
Graph a line from y = mx + b